This thesis investigates Japanese and German innovation policy on electric vehicles (EVs) and the interactions with development strategies of automobile Original Equipment Manufacturers (OEMs) from the first oil crisis onwards through the policy cycle and innovation systems approaches.

As both countries are at an equal level in other automotive technologies, the difference in EV development and commercialisation should be analysed.

Briefly summing up the results from the policy cycle perspective, both countries share a great number of characteristics.

First, there is a strong tendency of bottom-up policy agenda-setting and policy formulation. Although a case of top-down influence could be documented for Japan (a shingikai that is only created to rubber stamp bureaucratic policy proposals), there are also examples of bottom-up formulation. In Germany, the federal government largely refrains from sectoral intervention, but regional states (Länder) tend to promote certain (innovative) industries as regional economic policy.

Second, both countries use similar modes of decision-making and implementation. It appears that these similarities are mainly related to the fact that the investigated cases are in the same policy field. As innovation policy tends to be rather uncontroversial, technical, and rather unpredictable outcomes, this explains why different political systems apply similar problem solving strategies in policy-making. For the same reason, both countries apply similar policy tools for implementation.

However, there are some differences: Japan has a stronger tendency to support innovations through consumer subsidies than Germany. Moreover, while German ministries show a strong degree of cooperation, their Japanese counterparts are less likely to do so. However, during the timeframe covered by this study, Japanese agencies became more cooperative, which is rooted in administrative reforms.

To sum the findings from the innovation system perspective, the different level of EV development can be explained as an outcome of OEMs’ embeddedness in different innovation systems, exposure to external pressure, support through other industries, and differing product specialisations.

First, Japanese OEMs were affected by Californian regulation that demanded EV development in 1990. As regulation only applied to OEMs with 35,000 annual unit sales in California, German OEMs were not affected. Moreover, due to regulative peculiarity, other US states can chose between federal and Californian regulation, i.e. the impact was not limited to the state of California. As the US market is more important for Japanese OEMs than for their German counterparts, they were under more pressure to innovate.

Second, as batteries are EV core components, the electro-chemical industry is important. As Japanese battery producers were much more advanced than German ones, Japanese car-makers profited from this status of another domestic industry. To illustrate, NiMH batteries that were used in the Toyota Prius and Honda Insight were considered as experimental by German firms at that time.

Third, Japanese government support continued ever since the oil shock. Although support was initially on a low level, it was never discontinued. German government support was less stable.

Fourth, as most Japanese OEMs had specialised in more compact cars than German competitors, they enjoyed a benefit in EV development. As heavier cars require more powerful and in turn heavier batteries, German OEMs such as Daimler and BMW had technical reasons to reject battery EVs and favoured the more expensive and distant fuel cell EV type.

Fifth, German producers has an alternative development option. In the context of the EU, European states and the European automobile industry agreed to support Diesel technology as it was regarded as a low CO2 emitting technology. This means that EU countries tax Diesel fuel lower than gasoline which combined with the higher volumetric energy content of Diesel makes it attractive for consumers. Hence, German OEMs invested much more in Diesel technology than in EVs.

Sixth, when German producer Audi released an EV at the same time as the Prius, both governments adopted completely different policies: while Japan initiated consumer subsidy programs to support diffusion, the German government did not act.

Seventh, there is a simple but logical explanation for this behaviour. While Japan’s electricity mix made it sensible to utilise EVs as a emission reduction tool, the German coal heavy (56% in 1996) electricity mix would not led to lower emissions. Thus, the embeddedness into a certain technological feature made explains different policies.

Eighth, all OEMs display a high degree of path-dependence in technological development. This means that while policy can influence the direction of search, it cannot determine concrete technical solutions.

Taken together these reasons explain the currently advanced know-how and sales performance of Japanese OEMs in comparison to German ones. Weighting the factors against each other is difficult as they are highly interrelated. From the author’s perspective, especially the combination of Californian pressure and battery availability is crucial, because the latter actually enabled Japanese OEMs to conform with the former while German competitors did not have this option. Thus, this study confirms findings that successful innovation is highly context- and system dependent.

References
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